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BULLETIN

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# The ferns and flowering plants of Nantucket—XVI

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## CICHORIACEAE

CICHORIUM INTYBUS L.

In fields and by roadsides, not very common; most frequent in the neighborhood of the town. Twenty-seven years ago Mrs. Owen, writing of the chicory as a roadside plant along the south end of Orange Street, said that it had been known there for fifty years. It has remained established there to this day. First flowers July 3, 1912; continues in bloom nearly or quite through September.

KRIGIA VIRGINICA (L.) Willd.

Dry open places throughout, sometimes in white sand on dunes and wastes. Just in flower May 30, 1909; in full flower May 30, 1908; still in bloom July 4, 1912; a few remaining flowers August 6, 1906.

* HYPOCHAERIS RADICATA L.

Several clusters, in early bloom July 18, 1910, among the ruins of a house foundation on "the Cliff." Collected in 1898 by Warren H. Manning below "the Cliff," "where it seemed to be well established" (F. G. Floyd).

APARGIA AUTUMNALIS (L.) Hoffm.

Abundant and, when in full bloom, brightly conspicuous in low fields and grassy places everywhere in the town region and

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elsewhere over the island. First flowers May 30, 1909, June 3, 1911, June 7, 1908, June 15, 1910, continuing in bloom through September.

Much of the fall dandelion of Nantucket is the var. *pratensis* Koch, which, in its most strongly developed form having large flowers with nigrescent-lanate involucres, appears quite like a distinct species. Notwithstanding its abundance on Nantucket, *Apargia autumnalis* is a very scarce plant on Martha's Vineyard, occurring only sparingly at a few far separated stations. The var. *pratensis* seems to have made its appearance only on a few lawns at Oak Bluffs and Vineyard Haven not far from where the Nantucket boats make their landings.

* TRAGOPOGON PRATENSIS L.

Established in grassy lots on Main Street and on Milk Street straying out along the thoroughfares. Collected by Mrs. Flynn in 1895. First flowers June 3, 1909; still some flowers July 6, 1912.

LEONTODON TARAXACUM L.

*Taraxacum officinale* Weber.

*Taraxacum Dens-leonis* Desf.

Apparently not a very common plant on Nantucket, and certainly not there the abundant weed we are ordinarily accustomed to regard it. Observed in flower from May until September.

* LEONTODON ERYTHROSPERMUM (Andrz.) Britton.

*Taraxacum erythrospermum* Andrz.

Frequent about the streets of the town; roadside at Island Home and near the Polpis school house; thicket in Shawkemo; Sankaty Light. In full flower and with mature heads May 30, 1909. Collected by Judge J. R. Churchill in 1904 (F. G. Floyd).

* SONCHUS ARVENSIS L.

Established in lots along Easton Street and nearby localities on the north side of the town. Collected by Mrs. Flynn south of the town in 1904. Freshly in bloom July 4, 1912; in full flower September 10, 1909.

SONCHUS OLERACEUS L.

A frequent weed of waste and of cultivated ground in and near the town and occasional elsewhere. First flowers June 12, 1909;

in early flower June 14, 1908, June 19, 1910, June 28, 1912; continues to bloom until late in September.

SONCHUS ASPER (L.) Hill.

Less often seen in the town than at far outlying points, mainly along shores. First flowers July 12, 1909; in full flower July 13, 1912; blooms until late in September.

* LACTUCA VIROSA L.

Farm yard in Madequet, September 14, 1907, a colony of about two dozen plants of vigorous growth but bearing no flowers. At this station on July 10, 1912, only a few plants were to be found. The plant was the common one having unlobed denticulate leaves as distinguished from the pinnatifid-leaved *L. Scariola* L.

LACTUCA HIRSUTA Muhl.

Mainly on the hills and open slopes on the eastern side of the island, the plants usually solitary or so widely separated in their association as to appear so. Frequent in Shawkemo Hills and Saul's Hills, Polpis, Siasconset, South Pasture; rare on the western side of the island. In full flower August 7, 1906; some plants continuing to bloom after the middle of September.

LACTUCA CANADENSIS L.

Scattered widely over the island in dry, open places, sometimes growing in pure sand with *Ammophila arenaria*, the plants usually solitary or not more than a few together. Often reduced in size and with numerous crowded leaves, only the lower ones spreading and pinnatifid, those above much narrowed and entire and tending to be subappressed. Blooms from midsummer until after the middle of September.

* LACTUCA SPICATA (Lam.) Hitchc.

Damp thickets along the Wauwinet road at Shawkemo and Quaise. There it is rather common but elsewhere it was seen only by an old storehouse near the wharves, a single very tall plant, in 1906. In full flower September 5, 1904.

HIERACIUM CANADENSE Michx.

Nowhere common but scattered widely over the downs and

commons, mostly single plants or a few together. Plants one foot high June 29, 1912; not in flower up to August 16, 1906; in full flower early in September, continuing in bloom through the month.

HIERACIUM GRONOVII L.

Very common in dry open places throughout, flowering in August and September.

*Note—Hieracium scabrum* Michx. occurs on Martha's Vineyard and on Chappaquiddick Island and may yet be found on Nantucket.

* HIERACIUM AURANTIACUM L.

In June, 1909, Mrs. Mary A. Albertson showed me fresh flowering specimens of the orange hawkweed that had been brought in to the rooms of the Maria Mitchell Association, having been gathered back of the dunes near the bathing beach.

HIERACIUM MARIANUM Willd.

Not anywhere growing in close formations but scattered openly everywhere over the plains and commons this is one of Nantucket's characteristic plants. It blooms from early June through September, and doubtless, as on Martha's Vineyard, well into October; but autumn flowering seems to come about as a sort of second flowering period, for there is a late summer interval when the species passes nearly or quite out of bloom. Earliest leaves appearing May 30, 1909; first flowers June 8, 1908, June 12, 1909, June 15, 1910.

On Nantucket this species displays a ready variability deviating from its proper type into perplexing forms that appear to be more or less intermediate with *Hieracium venosum* L., or even scarcely to be distinguished from that species. Some examples, indeed, might readily pass without question for *H. venosum*, but I have not yet seen any Nantucket specimen that I could feel satisfied should bear that determination. On the other hand frequent examples match quite perfectly those more pronounced forms of *H. marianum* that develop a stout papillose-hirsute stem, leafy up to the firmly branched panicle. But the prevailing Nantucket plant is less coarsely pubescent and has the larger cauline leaves reduced in number to one or two only, low on the stem, and a

more open, even diffuse, corymbiform inflorescence. In hard shallow soils the basal leaves are relatively short and broad and are clustered in a flattened rosulate tuft after the manner of *H. venosum*, and may be either purple-venose as in that species or wholly green. In deeper and looser soils these lower leaves are more ascending on longer petioles and are often narrowly oblanceolate and tapering acute, a few of the outermost sometimes purple-veined; those that appear earliest are almost always papillose-pilose on the upper surface. The longer pubescence at the base of the leaves and stem varies from white-pilose to coarsely papillose-hirsute with tawny hairs and, in leafy forms, may extend well up on the stem which, also, with rare exceptions, is invested throughout with a minute floccose or tomentulose canescence that passes up through the entire panicle. This canescence of the panicle, together with the very glandular, pubescent and nigrescent involucre, appears to be a character worthy of primary consideration in the determination of ambiguous examples.

The apparent absence from Nantucket of typical *H. venosum*, while yet its influence would seem to be discernible there in the unstable phases of *H. marianum*, offers the suggestion that *H. venosum* may have once belonged to the island's flora. The course of its subsequent history there may then well have been that, having lost the protection of its original woodland it had been unable to hold its proper identity against the competition and possible interbreeding of a closely related and more dominant species.

* NABALUS SERPENTARIUS (Pursh) Hook.

Confined almost exclusively to the open plains on the south side of the island, and uncommon except in the southwest quarter; two small plants seen in Saul's Hills. Just in flower September 14, 1899. Often dwarfed, with simple stem and terminal inflorescence, the smaller plants only 2–3 dm. high and the cauline leaves 2–3 cm. long. Stouter plants become widely bushy branched and very floriferous but are never very tall.

NABALUS TRIFOLIOLATUS Cass.

Not uncommon on the eastern side of the island in thickets and open ground, especially in the southeast quarter. On the plains

east of the middle of the island it almost entirely replaces *N. serpentarius* of the western side, the two species rarely being found near together. In full flower August 30, 1904; continues in bloom through September.

On the exposed plains this species becomes even more dwarfed than the preceding, sometimes not exceeding 1.5 dm. in height when fully mature. This open ground form displays much purplish coloration which deepens to blackish purple in the upper parts and the involucres in marked contrast with the clear white rays. Its leaves are firm and unusually small, with their narrow deeply parted divisions and lobes cuspidate-acute; the bracts of the involucre are usually narrowly attenuate. A markedly contrasting form found in shaded thickets is taller and slenderly branched, little if at all purplish tinged, and with more ample and thinner leaves, except the lowermost often nearly entire or merely hastate lobed; the involucral bracts are commonly shorter and less tapering than in the contrasted form and the rays yellowish instead of clear white.

## AMBROSIACEAE

* IVA OVARIA Bartlett.

*Iva frutescens* auct. non L.

This characteristic salt marsh plant, here close to the northern limit of its range, I have seen nowhere else on Nantucket than near the harbor shore about Acquidness and Abram's Points where it thrives by the tide pools and along the marshes. Just in flower September 3, 1904.

* IVA XANTHIIFOLIA Nutt.

A single large plant in flower and fruit near the wharves September 15, 1904. A vigorous group on Howard Street, July 12, 1912, the tallest plants four feet high and the inflorescence just beginning to appear. This same colony had been observed by Mrs. Flynn August 17, 1911, and was also discovered by Miss Grace Brown Gardner, who has sent me fruiting specimens collected September 1, 1913.

The plants from these two stations seem to represent two rather distinct forms of the species, one having leaves triangular-

ovate and harshly papillate-pubescent, the other possessing a much finer and closer, even a soft, canescent pubescence, and more or less cordate leaves. In the latter, the Howard Street plant, the larger leaves were deeply cleft into three, or even five, broad overlapping lobes, these also deeply lobed and cut; the largest leaves were over 2 dm. in length and breadth, their primary divisions over 12 cm. wide.

* AMBROSIA TRIFIDA L.

A few rather low plants, with unlobed leaves, in waste spot west of the town, August 11, 1906, in full flower; young plants mostly under 15 cm. high, with deeply three- to five-lobed leaves, in a farm yard in Polpis, June 12, 1911.

AMBROSIA ARTEMISIAEFOLIA L.

An abundant weed flowering from late summer doubtless until killed by frost. Represented by several varieties or elementary species differing in leaf pattern and pubescence.

* AMBROSIA PSILOSTACHYA DC.

Mrs. Flynn has kindly sent me for examination specimens of this species in full flower and fruit collected by her near Sankaty Head, August 13, 1897. Dr. Rydberg has examined these specimens with me at the herbarium of the New York Botanical Garden. They are perfectly typical and are closely matched by numerous examples from the far west. I do not know that this species has ever been recorded from east of Illinois other than as a ballast plant, but it seems quite possible that it may have been making its way eastward unnoticed through its similarity to *A. artemisiaefolia*. Its presence on Nantucket in a part of the island where unusual introduced plants would scarcely be looked for is not suggestive that it is a wholly exceptional waif in our eastern flora. It is in point that it occurs also on Martha's Vineyard, where I found it along a weedy roadway at Edgartown in full flower September 14, 1910, and in mature fruit October 12, 1911. The only other eastern specimen of wich I have any knowledge is one in the herbarium of the New York Botanical Garden collected on ballast ground at Weehawken, New Jersey, September 6, 1895. But as far back as 1888 the species was included among the ballast plants found in the vicinity of New

York and Philadelphia, which was published in the "Preliminary Catalogue of plants within one hundred miles of New York City," compiled by a committee of the Torrey Botanical Club.

XANTHIUM ECHINATUM Murr.

Primarily a plant of the sea beaches, but not infrequent in waste places away from the shore. It thrives best where saline influences are strongest, and on the exposed ocean front becomes larger and coarser as well as paler in color than when growing along bays and estuaries, and at interior stations where it has chanced to spring up. Seedlings, May 30, 1909, unfolding their first leaves between the large spreading cotyledons; plants very small July 3, 1911; in full flower and fruit through September.

## COMPOSITAE

* EUPATORIUM MACULATUM L.

Rare; in "the Woods" several small scattered groups were just in bloom September 8, 1904; elsewhere it was seen only in a boggy spot east of Miacomet Pond, a single cluster.

* EUPATORIUM PURPUREUM L.

At one station only, and only a single group of plants. These grew on a bank in a low open thicket in Shawkemo, towards Quaise, the tallest plants nearly six feet high. When first seen, September 11, 1907, most of the stems had been trampled down by cattle and none had flowered. On June 7, 1908, they were growing up again, the larger stems being eighteen inches high. The plant is typical of *E. purpureum* as distinguished from *E. trifoliatum* L.

EUPATORIUM PERFOLIATUM L.

Abundant in low grounds. In August and September when the waters of the island are low the boneset may be seen in full flower fringing the high water line around many a pond and pool then well back from the water's edge, its masses of bloom sometimes forming an unbroken zone of white around the sandy shores. Evidently its seeds are carried by the wind to the surface of the ponds at the season of high water and are floated in numbers to the shore, finding protection in the flotsam there and a favorable medium for their germination the following season.

EUPATORIUM VERBENAEFOLIUM Michx.

Common in low grounds, often about thickets and among open growths of shrubbery. Flower buds visible July 4, 1912; in full flower August 7, 1906; blooming through September. The Nantucket plant, although often quite typical, is mainly the form with narrowed deeply incised leaves—var. *Saundersii* Porter.

EUPATORIUM PUBESCENS Muhl.

A single cluster in full flower August 16, 1906, at the border of a low thicket in Quaise. Collected on Nantucket twenty-three years earlier, August 18, 1883, by Judge J. R. Churchill. Judge Churchill has most kindly sent me for examination his specimen collected at that time, which is of particular interest as having been the basis of Mrs. Owen's record of *Eupatorium rotundifolium* on Nantucket. It is one of those troublesome forms that seem to lie midway between typical examples of *E. rotundifolium* and *E. pubescens*, and is very similar to my own Nantucket specimens which, after careful study, I do not doubt are properly referable to *E. pubescens*. Judge Churchill's specimen is a stout and large-leaved plant, the leaves reaching a size of 5–6 cm. in length by 4–5 cm. in breadth. As is the case with my own more slender and smaller-leaved specimens the number of flowers in the heads is mostly seven.

* EUPATORIUM HYSSOPIFOLIUM L.

Dry open ground near Sachacha Pond, on the southwest side, a considerable colony just in bloom August 13, 1906; Spotsor Country, several scattered stations; two small plants below "the Cliff," 1907; Pocomo, in full flower September 21, 1907.

* EUPATORIUM AROMATICUM L.

About dry thickets and in neighboring open ground, local. Quaise; Polpis, at several stations, and in abundance at one locality near Almanac Pond; by the railroad near the fifth mile post; Siasconset. In full flower August 31, 1904, September 19, 1907. Collected by Mr. Floyd near Tom Never's Head in 1902.

* MIKANIA SCANDENS (L.) Willd.

Wet thicket along Watt's Run where it twines in luxuriant growth among the shrubbery and in late August and in September

is conspicuous from its profuse bloom. "Gibb's Swamp, one plant, 1895, L. L. Dame" (F. G. Floyd).

LACINARIA SCARIOSA (L.) Hill.

A characteristic and attractive late flowering plant of the downs and moorland. It is found throughout the length of the island but, except locally, seems to be common only on the eastern side, more especially towards the southeast. It is scarce in the immediate vicinity of the town although frequent westward towards the waterworks; eastward it is scarcely to be found nearer than Shawkemo, and still further east and northeast it is scarce except in Pocomo; southeast of the town it first appears about two miles out near the railroad and south of the County Fair grounds, extending thence into Saul's Hills and southeast to the ocean shore where it may be seen flourishing in the wastes of white sand through which the railroad approaches Siasconset. It occurs in Madequet but seems to be wanting over most of the western half of the island. Widely variable. Plants a few inches high July 11, 1912; a few early flowers August 6, 1906; continues in bloom through September. One plant with white flowers, Almanac Pond, 1902 (F. G. Floyd). It is a common plant of Chappaquiddick Island, but I have not seen it elsewhere on Martha's Vineyard.

CHRYSOPSIS FALCATA (Pursh) Ell.

The golden aster is one of the very abundant plants of Nantucket, perhaps even more numerous than the bearberry, probably because less fastidious in its choice of soils, and spread far and wide over fields and plains where the bearberry has not made its way. Throughout the length and breadth of the island it is at home everywhere in dry sandy exposures where other vegetation is low and scant, even on the dunes and wastes of white sand where the beach grass may be the only other living thing. A precocious flower June 27, 1910; two open flowers July 8, 1912, flowers at several places the following day, quite generally in bloom two days later. Continues to bloom into October.

SOLIDAGO CAESIA L.

This golden-rod is among those named in Mrs. Owen's list. It is common on Martha's Vineyard and I have always expected

to come upon it somewhere on Nantucket but have never yet met with it there.

* SOLIDAGO BICOLOR L.

Found only on the eastern side of the island, mainly in the southeast quarter in the neighborhood of the railroad and scattered sparingly towards Saul's Hills; also near Sachacha Pond and Wauwinet. Just in flower September 1, 1904.

Although rather a scarce species on Nantucket it is there subject to as notable a degree of variation in leaf form and pubescence as is seen in regions where it grows in abundance. But beyond these usual variations are the more divergent characters of a form that I have seen nowhere else than on Nantucket. This is characterized by a pale or whitened appearance throughout due to a hoary-tomentulose canescence that invests the stem and branches and develops on both surfaces of the leaves into a soft tomentose or velutinous indument; and it is further noteworthy in its inflorescence which is borne at the ends of slender terminal branches that are closely set with small leaves of nearly uniform size; the flowers are small, their involucres only 2–3 mm. high, and the green tips of the scales, often so obvious in this species, are only faintly if at all perceptible. This variety appears to occur only on the open plains and scrub oak barrens in the southeastern quarter of the island.

SOLIDAGO PUBERULA Nutt.

A common golden-rod of the moorland and oak barrens and of open sandy places in certain soils. It is perhaps more abundant in the southwest and the northwest quarters than elsewhere, and is quite wanting in many parts of the island where the conditions do not differ obviously from those of the sections where it abounds. Just in bloom September 14, 1907. The panicle varies in form from virgate and only 2 cm. wide to oblong-pyramidal and more than 12 cm. in natural spread at its widest part.

SOLIDAGO ODORA Ait.

Rather common, although somewhat locally distributed, preferring open growths of low shrubbery in light sandy soil. Not in flower up to mid-August, 1906; mostly past flowering September 19, 1907.

SOLIDAGO SEMPERVIRENS L.

Along all the sea beaches and salt marshes, sometimes inland in dry sandy spots or in low grounds. A precocious spray in full bloom June 22, 1910; not nearly in flower up to August 16, 1906; blooming till late autumn.

SOLIDAGO RUGOSA Mill.

Frequent or rather common mainly on the eastern side of the island in or about low grounds. First flowers September 2, 1904, September 7, 1906.

A low villous form found in Polpis had small and narrow almost leafless panicles and numerous crowded leaves smooth or nearly so on the upper surface, the narrowly cut teeth with subcartilaginous tips, many of them firmly declined and even reflexed.

* SOLIDAGO RUGOSA × SEMPERVIRENS.

*S. asperula* Desf.

On a bank at the southwest side of Capaum Pond, several clusters in full flower September 12, 1907, growing with both *S. rugosa* and *S. sempervirens*. A distinct appearing and not rare seaboard golden-rod occurring sporadically and always, so far as I have observed it, in association with both of its reputed parents.

It is interesting, in view of the scarcely to be doubted hybrid character of this plant, that the most considerable colony I ever met with was in full bloom while yet its supposed parents growing close about it showed not an open flower. This was near Long Beach, Lond Island, September 5, 1909; on that day a few precocious flowers of *S. sempervirens* were seen at places favorable to early flowering, but *S. rugosa* was not anywhere nearly in bloom.

* SOLIDAGO ASPERA Ait.

Common, mainly along the borders of thickets and on dryish levels in low grounds. Not yet in flower up to August 16, 1906, just in bloom September 2, 1904.

A little recognized and widely variable golden-rod, not ordinarily to be confused with *S. rugosa*, but often associated with it and quite probably subject to intercrossing.

*** Solidago aestivalis** sp. nov.

A common Nantucket golden-rod of low grounds and boggy places, closely related to *S. rugosa*, but having a much earlier flowering period, and notable as the earliest flowering golden-rod of the island. In full flower August 4, 1906; passing out of bloom September 2, 1904, when the earliest flowers of *S. rugosa* were only beginning to appear; mostly past flowering and many panicles dried and brown September 1, 1907. Common also on Martha's Vineyard and on Lond Island and occurring on Staten Island.

Commonly from 8–12 dm. high (2–20 dm.), the stem strongly striate-angled, especially above, glabrous and shining or occasionally with some scattered hairs, typically deep or even bright purple throughout including the branches of the panicle; leaves deep green, numerous, the larger 6–14 cm. long and 2–3 cm. wide, elliptic-lanceolate, attenuate or acuminate often abrupt y rounded at the extreme base, the lowermost narrowed into rather long, margined petioles; blades not ordinarily rugose nor prominently venulose, appressed-serrate or, in one form, openly cut-serrate, the upper surface often lustrous, smooth and glabrous or with some scant obscure hairs, thinly pubescent with loose tapering hairs on the veins beneath, the narrower lower leaves sometimes finely close pubescent, their margined petioles ciliate; branches of the inflorescence angled and thinly villous-pubescent; inflorescence commonly of wide spreading and recurved foliaceous branches forming a broad open panicle, or the panicle sometimes elongated and short branched; heads numerous and crowded, secund in paniculate leafy-bracted racemes and short ultimate clusters; involucre 2.5 to 3.5 mm. long, its bracts linear-oblong to linear, obtuse, mostly ciliolate, subcarinate, firm, broader and less tapering than those of *S. rugosa* and not recurving in age, the prominent midrib mostly broadened into the greenish tip; rays commonly eight (6–12), the heads spreading 4–5 mm.; achene pubescent.

Type from Hewlett, Long Island, August 9, 1914, deposited in the herbarium of the New York Botanical Garden.

In the coastwise swamps of southern Long Island this golden-rod comes into bloom from the middle of July until early in August, three to five weeks in advance of *S. rugosa* and much of it is past flowering at the time the latter begins to bloom. The close relationship of *S. aestivalis* to *S. rugosa* is evident enough, and examples are not wanting that suggest either that the two are

sometimes intergradient or that they occasionally hybridize. Nevertheless it would be little doubted, I think, by anyone coming to know *S. aestivalis*, that it was essentially distinct, and long ago it became to me an authentic and, from its early time of flowering, a particularly interesting member of the golden-rod group. Its smooth and purple striate-angled stem is notably at contrast with the more terete and papillate-hirsute or villous stem of normal *S. rugosa*, although its smoothness may not be taken as a strictly determining character, for *S. rugosa* occasionally passes into glabrate forms; but such divergent plants, as I have met with them on Long Island, are obviously only local variations from the type not at all to be correlated with the normally glabrous stemmed *S. aestivalis*. In view of such variations, however, the characters of the latter might be given less weight did not its definitely earlier flowering period, both in its beginning and ending, imply a very pronounced remove from identity with the broadly similar *S. rugosa*.

SOLIDAGO ELLIOTTII T. & G.

Common in low grounds. Some flowering panicles September 10, 1907, but not yet generally in bloom at that time.

SOLIDAGO UNILIGULATA (DC.) Porter.

Not infrequent in *Sphagnum* bogs on the eastern side of the island. Not in flower up to the middle of August, 1906; in full bloom September 5, 1904.

*Note.—Solidago neglecta* T. & G. is named among the golden-rods of Mrs. Owen's catalogue, and it may well be a rare plant of Nantucket, but no evidence appears that it has ever been collected there. It is quite possible to mistake for it large examples of *S. uniligulata* or even forms of *S. Elliottii*.

* SOLIDAGO JUNCEA Ait.

This common eastern golden-rod seems to be all but absent from Nantucket, only a solitary cluster having been discovered there. This grew on a dry slope near the Wauwinet road about half a mile west of Pulling Mill Creek. On August 16, 1906, its several vigorous stems bore panicles of close green buds, and on September 11, 1907, it was in full bloom. The plant was perfectly

typical of the ordinary glabrous open ground form of the species, and this is to be particularly noted for a very interesting reason: all over Chappaquiddick Island grows the similar plant known as var. *scabrella* Gray, not hitherto reported, I think, on our eastern seaboard. Typical *S. juncea* was not found on Chappaquiddick Island, nor did I meet with it anywhere on Martha's Vineyard.

SOLIDAGO ALTISSIMA L.

*S. canadensis* Auct. non L.

Common, mainly along thickets near low grounds; disposed to grow in close masses, and frequently forming a broad encircling zone of yellow around the thickety borders of pond holes. Not nearly in flower August 16, 1906; freshly in bloom August 24, 1904.

The Nantucket plant is all typical of *S. altissima* as now understood, at least I did not succeed in finding on the island a smaller-headed and less pubescent golden-rod of the same group that is common in the neighborhood of New York and which, if it be the true *S. canadensis* of Linnaeus, as would seem to be altogether probable, judging from the description in Species Plantarum, is manifestly not the same as the more northern plant now known by that name and earlier described as var. *glabrata* Porter.

SOLIDAGO NEMORALIS Ait.

The Nantucket *S. nemoralis* is a hoary-canescent, mainly depressed or prostrate form that has been characterized by Professor Burgess as var. *arenicola*. It is an abundant species, perhaps the most so of all the Nantucket golden-rods, growing everywhere on open sandy levels, so thickly in many places as to give its color conspicuously to extensive tracts that support no tall herbage, but where the golden aster and the violet-flowered *Ionactes* aster also abound. Even in its more erect states it displays a strikingly different aspect from the more usual forms of *S. nemoralis*, but it appears to possess no essential distinctive characters. On Nantucket I have seen no examples unmistakably referable to typical *S. nemoralis*, but on Martha's Vineyard the case is different. There the divergence from *S. nemoralis*, although often as great, is not at all as general, and many examples are intermediate between the two forms. The case is analogous to that of a number of other plants, that, on Nantucket, show a

greater development of pubescence and a less erect habit than their usual mainland forms. First flowers early in September, 1904; in full bloom September 10, 1907.

EUTHAMIA GRAMINIFOLIA (L.) Nutt.

Local in dry places in all quarters of the island, especially on the eastern side, but irregularly distributed and wholly wanting throughout extensive areas. Not yet in flower August 16, 1906; first flowers September 17, 1907.

EUTHAMIA TENUIFOLIA (Pursh) Greene.

In dry or in damp sandy soil, or even in heavy soil in low grounds. Perhaps the commonest and most generally distributed golden-rod of the island, unless *S. nemoralis* should bear that distinction. Just in flower August 16, 1906.

Perplexingly variable. Some coarser forms appear to be quite intermediate with *E. graminifolia*. More delicate plants formerly included with this are better referred to the following, which, however, may be viewed with some reservation as to its validity.

EUTHAMIA MINOR (Michx.) Fernald.

Common, in its extreme form appearing like a very distinct species, but apparently intergrading with the preceding.

SERICOCARPUS LINIFOLIUS (L.) B.S.P.

Widespread over the downs and commons and invading open tracts of scrub pine, growing in separate often solitary tufts of stiff clustered stems. First flowers July 11, 1912, in full flower through August; late flowers in protected places September 12, 1907.

SERICOCARPUS ASTEROIDES (L.) B.S.P.

Everywhere on the open commons and hillsides, as well as in pine woodland, growing in small colonies of separate plants. First flowers July 11, 1912; in full flower through August and continuing to bloom through most of September.

* ASTER DIVARICATUS L.

Not uncommon in Squam, and occasional in Polpis, but so closely hidden in dense thickets as to be little seen unless carefully sought for. In full flower September 17, 1907.

On Nantucket this aster seems to be not widely variable, and wherever observed, except at one station, was characteristic of typical *A. divaricatus*, as defined by Professor Burgess; specimens from a number of stations agree closely with examples so named by him in the herbarium of the New York Botanical Garden. The only marked variation observed was in a thicket in Squam where specimens, in leaf only, collected July 4, 1912, seem to show a definite approach to *Aster persaliens* Burgess (Mem. Torrey Club **13**: 140. 1906).

On Chappaquiddick Island the species is less exclusively true to type and is represented by several well marked forms.

ASTER UNDULATUS L.

Nowhere in great abundance, but widely scattered over the moorland and commons, growing up into taller forms in the borders of thickets. Small green flower buds August 10, 1906; first flowers September 12, 1907. Widely variable, passing into the vars. *loriformis* and *torquatus* of Professor Burgess.

An ambiguous aster, a solitary plant of its kind, collected below "the Cliff" September 22, 1907, is linear-leaved and violet-flowered, and slightly roughish puberulent on stem and leaf. It appears to combine so unmistakably characters of *Aster undulatus* and *Aster dumosus* that there would seem to be little reason to doubt a hybrid origin from those species.

ASTER PATENS Ait.

A common dry soil aster of thickets and open ground. Often reduced in size and bearing small and much roughed leaves, and relatively small heads with deep colored rays. A single precocious flower August 16, 1906; generally just in bloom September 11, 1907.

ASTER NOVI-BELGII L.

The prevailing aster of low grounds and boggy places, widely variable and readily passing into a number of diverse forms; var. *elodes* Gray is common throughout; var. *atlanticus* Burgess, although rather scarce, is sometimes of pronounced character, the larger leaves becoming 1.5 dm. long by 3 cm. wide; other forms seem to be more or less representative of var. *littoreus*

Gray. In full flower through September; precocious flowers are frequent before the middle of August.

An aster in full flower, collected by the Wauwinet road near Norwood, is quite intermediate between this species, more especially var. *elodes*, and *Aster dumosus*, and has every appearance of being a hybrid.

ASTER CONCOLOR L.

One of the conspicuous late flowering plants of the plains and commons. It is not ordinarily densely massed in growth, but at Hummock Pond along a bank of white sand close to the ocean shore it was seen late in September outspread in an even more continuous breadth of color than a bed of violets in spring. First flowers September 8, 1904, September 15, 1907. It is also a very common aster of Chappaquiddick Island where I have seen it still in full flower as late as the middle of October.

The pubescence of the early leafy shoots is remarkably different from the canescent investiture of the mature stems consisting of silky-villous horizontally spreading hairs, some of them 4–5 mm. in length. The earlier leaves which are spreading, and densely pilose and long ciliate, are, by a twist at the base, brought into two opposite series along the stem with their surfaces in lateral aspect instead of horizontal, after the manner of *Lactuca virosa*.

ASTER SPECTABILIS Ait.

Rather common towards Siasconset in open thickets of low shrubbery in dry places; scarce in other parts of the island: Wauwinet road less than two miles from the town; near the south shore to the west of Miacomet Pond; north of Long Pond. In full flower August 30, 1904; September 11, 1907.

ASTER DUMOSUS L.

Perhaps the most common and generally distributed aster of the island, most numerous in sandy soil in low grounds. In full flower September 10, 1907. Forms having small heads with deep lavender rays contrast markedly with other forms having larger heads with the rays pure white. A form referable broadly to the var. *cordifolius* (Michx.) T. & G., yet not the same as the typical southern extreme of this plant, is occasional in pine barrens.

* ASTER VIMINEUS Lam.

In damp places in fields and open ground, rather scarce, the var. *foliolosus* Gray occasional. Just in flower September 4, 1904; not yet in bloom September 12, 1907.

* ASTER LATERIFLORUS (L.) Britton.

Frequent or rather common in thickets on the eastern side of the island. Small green flower buds August 13, 1906; just in bloom September 11, 1907.

In the ordinary shade forms the leaves may be thin and coarsely cut-serrate, becoming over 2.5 cm. broad, or narrow, and entire or nearly so. In more open thickets the plant becomes taller, sometimes 1.2 m. high, with the openly wide spreading or drooping branches 4–5 dm. long—var. *pendulus* Burgess; forms similar to this growing in sunnier places are sometimes almost grayish puberulent in their upper parts, and have linear-lanceolate and rather roughish leaves, and narrower involucral bracts than the more glabrate shade forms. Other forms agree closely with specimens labeled by Professor Burgess var. *horizontalis* (Desf.).

* ASTER MULTIFLORUS Ait.

Very common in dry fields and along roadsides as well as in the town streets. Here and there a plant showing its earliest flowers September 12, 1907. At certain localities on exposed levels near the south shore many dwarf plants grow firmly prostrate on the parched soil blooming no less profusely than the normal erect plant.

* ASTER PRINGLEI (A. Gray) Britton.

One of the surprises of Nantucket. A numerous colony established along the face of the low clayey bank back of the beach at Siasconset, south of the settlement, in full flower August 30, 1904; much of it past flowering September 15, 1907.

It was so unexpected to find this aster on the seaboard, and at the latitude of Nantucket, that I have been particular to have its identity confirmed by Professor Burgess. It is perfectly typical and closely matches authentic material from Vermont, Michigan and Wisconsin.

*Note.*—If *Aster ericoides* L. occurs on Nantucket it is yet to

be detected there. The absence of this common eastern species is one of the noteworthy negative features of the Nantucket flora. Its name does, indeed, appear among those of the common asters of Mrs. Owen's catalogue, but since the abundant *Aster multiflorus* is omitted it seems to be evident that the one was mistaken for the other. It occurs on Martha's Vineyard where, however, it is scarce and local.

* ASTER TENUIFOLIUS L.

Locally common in salt marshes along the harbor in the northeastern quarter of the island, growing in the black grass (*Juncus Gerardi*): Quaise, Swain's Neck, Squam, Pocomo. In early flower August 16, 1906; in full flower September 21, 1907. Observed in flower on Chappaquiddick Island as late as October 12, 1911.

ASTER SUBULATUS Michx.

One of the common plants of the salt marsh flora, mainly on mud flats and along the borders of tide pools and ditches, blooming during September. In full flower on Chappaquiddick Island as late as October 9, 1910.

IONACTIS LINARIIFOLIUS (L.) Greene.

An abundant aster of the dry sandy plains and commons. Its natural flowering season, when everywhere it reaches its height of bloom, appears not to begin much before mid-September, but precocious flowers are frequent in midsummer, and have been observed as early as July 5 (1912). First flowers early in September, 1904, September 12, 1907; generally still in full bloom on Chappaquiddick Island as late as October 11, 1908.

DOELLINGERIA HUMILIS (Willd.) Britton.

Somewhat locally rather common in low grounds across the northern side of the island, also about Siasconset. Minute flower buds July 11, 1912; not in bloom up to August 16, 1906; in full flower during September.

A striking bit of evidence of the far reach to Nantucket of a more southern flora is the replacement there of the common *Doellingeria umbellata* (Mill.) Nees, natural to the latitude, by this closely related plant that is not known elsewhere north of southern New Jersey. It matters little how close may be the relationship

of these asters, or even if they are intergradient—here on Nantucket is the plant of the New Jersey pine barrens in exact counterpart and perfectly acceptable to the eye as being not the same as its more northern relative. As compared with the latter the Nantucket plant has shorter and broader leaves of thicker texture, deeper green above and conspicuously pale beneath, harmonizing well by contrast of color with the usually deep purple stems. Although it grows to a height of 1.5 m. and has leaves as broad as 3–4 cm., there is an interesting smaller form only 5–6 dm. high with more numerous crowded leaves, 4–5 cm. long, 1.25–1.50 cm. broad. In the most typical examples the involucral bracts are broader and more obtuse than those of *D. umbellata*, and the pappus at maturity is of a bright cinnamon brown color. It is quite possible that typical *D. umbellata* grows in some of the Nantucket swamps but I have never collected it.

* ERIGERON PULCHELLUS Michx.

Not infrequent in Pocomo, especially towards Wauwinet; observed elsewhere only in Quaise, a small colony, and at the border of Tom Never's Swamp, a solitary cluster. In full flower June 9, 1909, 1911.

* ERIGERON PHILADELPHICUS L.

Several well developed plants in full flower June 22, 1910, at the border of a swamp west of Long Pond.

* ERIGERON ANNUUS (L.) Pers.

Scarce. A single flowering plant in an old field near Miacomet Pond September 21, 1899; a group in the same locality, just in bloom June 22, 1910; one plant on Lily Street August 6, 1906; well colonized in a pasture near Island Home, June, 1912.

ERIGERON RAMOSUS (Walt.) B.S.P.

Widely scattered over the downs and commons, mostly single plants of low stature; of better size and more gregarious habit in old fields and grass lands. First flowers June 18, 1908, June 25, 1910, 1912, blooming through September.

Mrs. Owen's catalogue records the occurrence of the frequent form or state of the species having the rays very short or wanting —var. *discoideus* Robbins.

LEPTILON CANADENSE (L.) Britton.

*Erigeron canadense* L.

A very common weed of old fields and dry open places, blooming in August and September.

* LEPTILON PUSILLUM (Nutt.) Britton.

*Erigeron pusillus* Nutt.

In December, 1913, it was shown by Dr. Robinson (Rhodora **15**: 205–209) that *Leptilon pusillum* was a valid species, an acute discrimination, and the plant was reported from localities in the Cape Cod region and from Martha's Vineyard, and, as these pages go to press, I am enabled to record it from Nantucket, typical examples, collected during the past season, having been sent to me by Miss Grace Brown Gardner. Miss Gardner writes me that she met with it at a number of localities, and I myself, in a very brief visit to Nantucket late in September, found it to be widely scattered there, inland as well as near the shores. It was also found to be an abundant plant of Martha's Vineyard, fully as numerous, I think, as *Leptilon canadense* and, like that familiar weed, distributed from the sandy levels along the shores to open hillsides in the interior of the island. Where it mixed freely with *L. canadense* there were not wanting examples that appeared almost to unite the two species, although no specimens were found that could not be fairly assigned to the one or the other. The purple tips of the involucral bracts which, from observations made on Long Island, I had come to look upon as an absolutely constant character, here proved to be, locally, a very unstable one. In most specimens, however, in which at first sight the purple tips seemed to be absent, it was usually possible to detect them in some of the heads, even if only on the inner bracts. Occasional specimens in which the purple tips were quite wanting showed involucres more or less purple tinged throughout. Late in the season the rays both of this species and of *L. canadense* often become pink tinged or rose color, and purple tips often appear on some of the involucral bracts of *L. canadense*.

# Mosses of the Philippine and Hawaiian Islands collected by the late John B. Leiberg

R. S. Williams

## PHILIPPINE SPECIES

Trematodon capillipes C. Müll. Luzon: Mariveles Mountain, *1267*.

**Dicranella** (*Anisothecium*) **Leibergii** sp. nov.

Growing in rather soft, not very compact, brownish green mats; stems short, 4–5 mm. long and simple or sometimes with a single branch up to 1 cm. long; leaves laxly spreading-flexuous, narrowly lanceolate, up to 3 mm. long, widest (about 0.35 mm.) near the base and uniformly narrowed to the acute or narrowly obtuse, slightly denticulate apex, the margins below entire and flat or slightly recurved; costa one sixth or less the width of the leaf-base and nearly or quite percurrent; leaf-cells all more or less linear with slightly thickened walls, the median 6–8 $\mu$ wide and often 100 $\mu$ long, the basal wider, mostly 10–12 $\mu$; perichaetial leaves with loosely clasping, somewhat larger base than those of the stem; seta rather weak, finally reddish, mostly 8–9 mm. long; capsule erect, oval-oblong, 1–1.5 mm. long without lid, becoming cylindric and somewhat contracted under the mouth when old and dry, the exothecal cells with somewhat thickened, nearly straight lateral walls, the median cells 16–20 $\mu$ wide by 35–60 $\mu$ long, the stomata at the base few or quite lacking; lid obliquely subulate, about 0.75 mm. long; annulus none; peristome-teeth about 250 $\mu$ high, regular, lanceolate, reddish brown below and vertically striate, divided about half way down into pale, papillose forks and borne on a basilar membrane scarcely extending above the rim; spores rough, 16 $\mu$ in diameter; calyptra cucullate, smooth, extending well down the capsule.

Polillo Island: May, 1909, *1260*.

In habit this species is much like *D. flaccidula* Mitt. of Fiji and Samoa, but the latter has an annulus, a different peristome, and spores only 3–4 $\mu$ in diameter.

Leucoloma molle (C. Müll.) Mitt. Luzon: Mariveles Mountain, July, 1909, *1273*.

DICRANOLOMA BLUMEI (Nees) Ren. Luzon: Mariveles Mountain, July, 1904, *1211*.

LEUCOBRYUM JAVENSE (Brid.) Mitt. Luzon: Mariveles Mountain, July, 1909, *1220*.

LEUCOBRYUM SANCTUM Hampe. Luzon: Tignaon, Lobayet Divide, May, 1909, *1250*.

LEUCOBRYUM SERICEUM Broth. Luzon: Tignaon Valley, Tayabas Province, 350 m. alt., May, 1909, *1249*.

OCTOBLEPHARUM ALBIDUM (L.) Hedw. Luzon: Mariveles Mountain, 760 m. alt., July, 1909, *1218*.

ARTHROCORMUS SCHIMPERI Dz. & Mb. Luzon: Mariveles Mountain, July, 1904, *1212*.

FISSIDENS INVOLUTUS Wils. Luzon: Legaspi or Lobayet, 1909, *1254a*. An Asiatic species not before credited to the Philippines.

FISSIDENS MITTENI Paris. Polillo Island: May, 1909, *1252*. This species of Ceylon, Java and Singapore is also new to the Islands.

FISSIDENS ZIPPELIANUS Dz. & Mb. Luzon: Lobayet River, Tayabas Province, on rock, 1909, *1253*.

SYRRHOPODON ALBOVAGINATUS Schwaegr. Luzon: Infanta, Tayabas Province, at sea-level, May, 1909, *1262*.

SYRRHOPODON MUELLERI Dz. & Mb. Luzon: Lobayet, Tayabas Province, 1909, *1237*.

SYRRHOPODON SUBTUBULOSUS Broth. Luzon: Mariveles Mountain, 400 m. alt., on trees, July, 1904, *1215*.

CALYMPERES DOZYANUM Mitt. Luzon: Tignaon Valley, Tayabas Province, May, 1909, *1234*.

CALYMPERES MOLUCCENSE Schwaegr. Luzon: Infanta, Tayabas Province, on mangrove shrubs, May, 1909, *1235*.

HYOPHILA COMMUTATA Broth. Polillo Island: May, 1909, *1259*. The first record of this species of Sumatra and Java for the Philippine Islands.

**Didymodon orientalis** (Willd.) comb. nov. (*Trichostomum orientale* Willd.; C. Müll. Syn. 1: 568. 1849.) Luzon: Legaspi, April, 1909, *1255*.

BARBULA ANGUSTIFOLIA (Hook. & Grev.) C. Müll. Luzon: Legaspi, on old walls, May, 1909, *1256*.

BARBULA CONSANGUINEA (Thw. & Mitt.) Sauerb. Luzon: Lobayet or Legaspi, 1909, *1254*.

**Barbula lobayetensis** sp. nov.

Dioicous, the male plant with one or two lateral appearing flowers each containing four or five antheridia, about 0.4 mm. long, and filiform paraphyses enclosed by two very broad, golden brown perigonial leaves scarcely longer than the antheridia: growing in rather thin mats with mostly simple stems 5–8 mm. long, radiculose below, leafy in the upper part and often bearing in the leaf-axils pale, branching filaments with star-shaped propagulae at their tips; stem-leaves irregularly flexuous or crispate when dry, up to 2.5 mm. long, nearly linear, sometimes slightly wider in the upper part, the somewhat recurved apex acute and denticulate, the margins below entire, papillose, flat in the upper leaf, sometimes recurved below; costa percurrent, 50–60 $\mu$ wide just above the base, in cross-section showing about four guide-cells, stereid bands above and below them and outer cells somewhat differentiated; cells of upper part of leaf distinct, papillose, mostly nearly square, about $6 \times 6\ \mu$, in the lower third, rectangular, paler, mostly 8–10 $\mu$ wide by 20–30 $\mu$ long; perichaetial much like the stem-leaves but with somewhat larger, scarcely clasping base; seta 8–10 mm. long; capsule cylindric, about 1.5 mm. long without lid, the exothecal cells with thin walls, the median about 16 $\mu$ wide by 40–50 $\mu$ long, those at the rim somewhat transversely elongate, in four or five rows, the stomata few, in one row near the base; lid subulate, about 1 mm. long; annulus none; peristome reddish brown, finely papillose, the basal membrane extending 40–50 $\mu$ above the rim and bearing filiform teeth about 0.5 mm. long and twisted once around; spores pale, smooth, about 10 $\mu$ in diameter; calyptra slightly rough at the apex.

Luzon: Lobayet, Tayabas Province, on earth, May, 1909, *1258*.

This species has propagula about like those of *B. sobolifera* Fleisch., but the leaves are very different; in habit it is quite similar to *B. pseudoehrenbergii* (Lorentz) Fleisch., a somewhat larger species with the apex of the leaf incurved and bearing in the axils of the leaves club-shaped propagula.

MACROMITRIUM ORTHOSTICHUM Nees. Luzon: Mariveles Mountain, 400 m. alt., on trees, July, 1904, *1215b*.

MACROMITRIUM ROBINSONII R. S. Williams, Bull. N. Y. Bot. Gard. **8**: 344. 1914. Luzon: Mariveles Mountain, July, 1904, *1219*.

MACROMITRIUM SEMIPELLUCIDUM Dz. & Mb. Luzon: Mariveles Mountain, 400 m. alt., on trees, July, 1904, *1215a*.

POHLIA SAXENSIS R. S. Williams, Bull. N. Y. Bot. Gard. **8**: 347. 1914. Polillo Island: May, 1909, *1272*.

ORTHOMNIUM STOLONACEUM Broth. Luzon: valley of Lobayet, Tayabas Province, May, 1909, *1241*.

WEBERA RUPESTRIS (Mitt.) C. Müll. Polillo Island: on wet banks, May, 1909, *1236a*. Not before credited to the Islands.

RACELOPUS PILIFER Dz. & Mb. Polillo Island: May, 1909, *1236*.

SPIRIDENS LONGIFOLIUS Lindb. Luzon: Mariveles Mountain, 760 m. alt., July, 1904, on trees, *1201*.

AEROBRYOPSIS LANOSA (Mitt.) Broth. Luzon: Mariveles Mountain, July, 1904, *1206*.

AEROBRYOPSIS LONGISSIMA (Dz. & Mb.) Broth. Luzon: Mariveles Mountain, 550 m. alt., July, 1904, *1207*.

FLORIBUNDARIA FLORIBUNDA (Dz. & Mb.) Fleisch. Luzon: Lobayet, Tayabas Province, 1909, *1245*.

NECKEROPSIS CRINITA (Griff.) Fleisch. Luzon: Infanta, Tayabas Province, 1909, *1240*; Lobayet, Tayabas Province, *1251*.

NECKEROPSIS LEPINIANA (Mont.) Fleisch. Luzon: Lobayet river, Tayabas Province, May, 1909, *1248*.

HOMALIODENDRON MICRODENDRON (Mont.) Fleisch. Luzon: Mariveles Mountain, on tree, July, 1904, *1217a*.

DISTICHOPHYLLUM OSTERWALDII Fleisch. Luzon: Lobayet, Tayabas Province, 1909, without number.

CALLICOSTELLA BECCARIANA (Hampe) Jaeg. Polillo Island: May, 1909, *1224*.

CALLICOSTELLA PAPILLATA (Mont.) Jaeg. Luzon: Tignaon, *1230;* Infanta, Tayabas Province, on trees, May, 1909, *1263a*.

CHAETOMITRIUM PAPILLIFOLIUM Bryol. Jav. Polillo Island: May, 1909, without number.

HYPOPTERYGIUM VRIESEI Bryol. Jav. Luzon: Tignaon, Tayabas Province, *1233*.

RHACOPILUM SPECTABILE Reinw. & Hornsch. Luzon: Tignaon, Tayabas Province, May, 1909, *1232*.

PSEUDOLESKEOPSIS DECURVATA (Mitt.) Broth. Luzon: valley of Lobayet, Tayabas Province, river bank, May, 1909, *1223*.

PELEKIUM VELATUM Mitt. Polillo Island: 1909, *1239*.

THUIDIUM PLUMULOSUM (Dz. & Mb.) Dz. & Mb. Luzon: valley of Lobayet, on trees at sea-level, May, 1909, *1237*.

ECTROPOTHECIUM CYPEROIDES (Hook.) Jaeg. Luzon: Lobayet, Tayabas Province, May, 1909, *1231*.

ECTROPOTHECIUM MORITZII C. Müll. Luzon: valley of Tignaon, Tayabas Province, on the ground at sea-level, May, 1909, *1221*.

TRISMEGISTIA LANCIFOLIA (C. Müll.) Broth. Luzon: valley of Tignaon, May, 1904, *1225*.

ISOPTERYGIUM MINUTIRAMEUM (C. Müll.) Jaeg. Apparently this species. Polillo Island: May, 1909, without number.

TRICHOSTELEUM HAMATUM (Dz. & Mb.) Jaeg. Luzon: Mariveles Mountain, on ground, logs, etc., 760 m. alt., July, 1904, *1218a*.

TRICHOSTELEUM PAPILLATUM (Harv.) Jaeg. Luzon: valley of Tignaon, on the ground at sea-level, May, 1909, *1222*. Polillo Island: May, 1909, *1228*.

TAXITHELIUM ALARE Broth. Luzon: Mariveles Mountain, on decaying twigs, etc., July, 1904, *1203*.

TAXITHELIUM INSTRATUM (Brid.) Broth. Luzon: Mariveles Mountain, 550 m. alt., July, 1904, *1205*.

VESICULARIA CAMPYLOTHECA (Broth.) Broth. Luzon: Infanta, Tayabas Province, May, 1909, *1226*. Polillo Island: May, 1909, *1229*.

VESICULARIA FILICUSPIS Broth. Luzon: valley of Tignaon, on the ground at sea-level, May, 1909, *1221a*.

VESICULARIA MEYENIANA (Hampe) Broth. Luzon: Infanta, Tayabas Province, on trees, May, 1909, *1263*.

SEMATOPHYLLUM HYALINUM (Reinw.) Jaeg. Luzon: Mariveles Mountain, 600 m. alt., *1208;* 760 m. alt., July, 1904, *1204;* 870 m. alt., *1202*.

## HAWAIIAN SPECIES

DICRANELLA HAWAIICA (C. Müll.) Broth. Oahu: Honolulu, March, 1909, *1261*. Determined from the description only.

**Hymenostomum ovale** sp. nov.

Dioicous, the male plant with a single terminal flower, the inner antheridial leaves very short and broad, deeply concave, sometimes obtuse, enclosing six to eight antheridia and rather abundant, slightly longer paraphyses: growing in rather compact, pale greenish cushions with mostly simple stems 2–3 mm. high; stem-leaves crispate when dry, 1.5–2 mm. long, nearly linear, acutely pointed, the margins entire and more or less inrolled in the upper three fifths either wet or dry; costa about 45 $\mu$ wide just above the base and one sixth the width of the leaf-base, slightly excurrent into a more or less incurved point, smooth on the back, in cross-section near the middle showing four guide-cells, stereid bands above and below them and outer cells on the ventral side large, on the dorsal side, scarcely differentiated; leaf-cells mostly four-sided, about $8 \times 8$ $\mu$ in upper part, rather obscure and finely papillose on both upper and under surface, the basal cells rectangular, 8 $\mu$ wide by 25–30 $\mu$ long toward the costa, with slightly thickened, pale, not hyaline walls; perichaetial leaves much like those of the stem, but with slightly larger base; capsule oval, about 1 mm. long without the lid, the lid subulate, oblique, often nearly as long; exothecal cells thin-walled, elongate-hexagonal to rectangular, about 25 $\mu$ wide by 40–60 $\mu$ long, the stomata few, near the base, sometimes not evident; annulus and peristome none; spores rough, round, about 20 $\mu$ in diameter; calyptra cucullate, extending far below the lid, the apex smooth.

Oahu: Honolulu, March, 1909, *1247*.

**Claopodium hawaiense** sp. nov.

Dioicous: growing in thin, yellowish green mats with irregularly branching, smooth stems mostly less than 1 cm. long, bearing few radicles and spreading-flexuous, not decurrent, somewhat complanate leaves; leaves of stem and branches very similar, about 0.5 mm. long, ovate-lanceolate, the tapering point serrulate, the border of one row of more or less differentiated cells, serrulate all round; costa often pale, about 16 $\mu$ wide at the base, smooth, extending into the point, sometimes appearing slightly excurrent; cells of upper part of leaf mostly rhomboidal, about 6 $\mu$ wide by 16–20 $\mu$ long, below more elongate and irregular, the upper and median cells mostly unipapillate on each side, the papillae sometimes extending almost to the leaf-base and very prominent on the

branch-leaves but often almost lacking on the lower part of the stem-leaves; perichaetial leaves loosely convolute, erect, smooth, broadly oblong-lanceolate, the inner nearly 1.5 mm. long with rather short, narrowly acute, not quite entire point; seta rough throughout, 10–12 mm. long; capsule oblong, nodding, about 1 mm. long without the lid, constricted under the mouth when dry, the exothecal cells mostly oblong with walls much thickened at the angles, the stomata few, near the base; annulus large; outer peristome finely cross-striate below, papillose in the upper part, the inner about as high as the outer, consisting of a high basal membrane, rather pale and minutely papillose, bearing narrow, keeled segments with short, narrow slits along the median line and terminating in filiform points with one or two slender, nodose cilia nearly as long, between them; lid conical, acute, its height slightly exceeding the basal diameter; spores not quite smooth, about 10 $\mu$ in diameter.

Oahu: Honolulu, March, 1909, *1227*.

Compared with *C. prionophyllum* (C. Müll.) Broth. of India, Java and the Celebes, this species is perhaps slightly stouter and has broader, shorter pointed, more serrulate leaves as well as a rough seta.

# The genus Teloschistes in North America

R. Heber Howe, Jr.

(with two text figures)

The genus *Teloschistes** which was proposed by Norman (Conat. gen. nullull. Lich., Nyt. Mag. Naturvid. **7**: 228. *pl. 1, f. 4 a–g.* 1853) included under his division "(*a*) Thallus fruticulosus," beside the type species, *T. flavicans* (Sw.) Norm., only one other, *T. villosus* (Ach.) Norm., though under two other sections, i. e., *Phyllothallae* and *Placothallae*, he placed nine additional species, which have since found their proper positions in several other distinct genera. As both of the above named species are characterized by a radial thallus it is not surprising to find that later in 1861 (Gen. Het. Recog. 51) Th. Fries logically limited the genus to include only these two species and the radial *Lichen chrysophthalmus* L. The authors who have included bifacial (dorsiventral) species in Norman's genus have no good arguments in their favor, as recently pointed out by Monsieur Hue.

The present species have been found from time to time in many genera as follows: *Lichen* L., 1771; *Usnea* Hoffm., 1795; *Parmelia* Ach., 1803; *Physcia* Michx., 1803; *Borrera* Ach., 1810; *Cornicularia* Pers., 1826; *Evernia* Fries, 1831; *Hagenia* Rbhn., 1850; *Blastenio-spora* Trevis., 1853; *Tornabenia* Massal., 1853.

## TELOSCHISTES Norm. em. Th. Fries

Description: *Thallus* caespitose or prostrate, branched, without rhizoids; *cortex* glabrous or rugose-lacunose; structure simple (hyphae parallel in the surface); *laciniae* terete, subterete or angularly compressed; cinereus or yellow; medulla and axis arachnoid, simple. *Gonidia* stratified (heteromerous): *Protococcoid*. *Soralia* normal. *Cephalodia* unobserved. *Apothecia* lecanorine, terminal or marginal; scutelliform, applanate or concave, rarely convex; marginate, disk concolorous. *Asci* clavate,

* By many authors spelled *Theloschistes*.

containing eight spores; paraphyses gelatinous, slender, apices branched and articulate. *Spores* simple or polari-bilocular,* hyaline, ellipsoid. *Spermagones* oblong-ellipsoid. *Sterigmata* simple. *Spermatia* cylindrical.

OBSERVATIONS: There are but three species of the genus common in North America, and only one of these has a wide distribution throughout the area.

**Key to the species**

Thallus glabrous.
- Laciniae slender, terete ..... *T. flavicans*
- Laciniae thickened, compressed ..... *T. chrysophthalmus*

Thallus hispid ..... *T. villosus*

## TELOSCHISTES FLAVICANS (Sw.) Norm.

*Lichen flavicans* Sw. Nov. Gen. Spec. Pl. Prod. 147. 1788.
*Teloschistes flavicans* Norm. Nyt. Mag. Naturv. 7: 229. 1853.
*Theloschistes chrysophthalmus* b. *flavicans* Wallr. of Tuckerman.

TYPE: Untraced.

TYPE LOCALITY: "Jamaica."

ORIGINAL DESCRIPTION: "foliaceus, lineari-teretiusculus ramosus fulvus, scutellis planis marginalibus concoloribus."

FIGURES: Swartz, Lich. Amer. *pl. 2.* 1811.

DIAGNOSIS: *Thallus* prostrate, *slender, terete,* apothecial margins *eciliate.*

DESCRIPTION (typical): *Thallus* caespitose or prostrate, rarely subpendulous (alt. 5 cm.), subrigid, terete or subterete, yellow or pale virescent; *cortex* glabrous, rarely puberulent, often papillosoraliate (white), sublacunose; *branches* thyrsoid-entangled (maximum width 2 mm.), apices attenuate, flexuous, fibrillose. *Apothecia* common (except at northern limit of range), lateral, concave, marginate, margins eciliate, disk concolorous to vitelline (maximum diameter 3 mm.). *Spores* polari-bilocular, 6.5–12 × 12–20 μ.

CONTINGENT PHASES: Unobserved.

SUBSTRATA: Trees and shrubs; "rocks and earth" *Herre.*

GEOGRAPHICAL DISTRIBUTION: Not uncommon in the Austral Zone. It extends on the Atlantic Coast from Newfoundland to Nantucket, Bermuda and Florida, and west to the Santa Cruz Peninsula, California. It occurs also throughout the West Indies and northern South America.

* Rarely tetrablast.

OBSERVATIONS: This species, distinguished by its slender, subterete thallus, has a largely maritime distribution above the thirty-second parallel. It shows a transitional development of growth from the slender subpendulous plants growing in littoral localities to the more robust, caespitose plants that back the coast and intergrade toward the species *T. chrysophthalmus*. It shows also an interesting transitional coloration from the more virescent shades of the northern examples to the bright yellow southern Gulf specimens which approach or are identical with *Cornicularia crocea* Ach.

EXSICCATI: Merrill, Lich. Exsicc. *59*.

TELOSCHISTES CHRYSOPHTHALMUS (L.) Th. Fries

*Lichen chrysophthalmus* L. Mant. 311. 1771.

*Theloschistes chrysophthalmus* Th. Fries, Gen. Het. Recog. 51. 1861.

TYPE: In the Linnean herbarium, Burlington House, London, England.

TYPE LOCALITY: "Cap. b. spei."

ORIGINAL DESCRIPTION: "Foliaceus subimbricatus linearis lacerus ciliatus; peltis elevatis radiatis fulvis."

FIGURE: Wulf; Jacq. Coll. *pl. 4, f. 3*. 1786.

FIG. 1. The Linnean type of *Lichen chrysophthalmus*.

DIAGNOSIS: *Thallus* erect, *compressed*, apothecial margins *ciliate*.

DESCRIPTION (typical): *Thallus* caespitose (alt. 2 cm.), subrigid, subterete, compressed or angulate; yellow or pale virescent; *cortex* glabrous, often puberulent, lacunose-rugose, rarely reticulate; *branches* dichotomous (maximum width 3 mm.), generally paler below, apices multifid, fibrillose. *Apothecia* common, subterminal, concave or convex, marginate or emarginate, margins radiantly ciliate, disk yellow to vitelline (maximum diameter 5 mm.). *Spores* polari-bilocular 10–18 × 5–8 μ.

CONTINGENT PHASES: (*a*) *Thallus* cinereous, apothecial margins eciliate (= *Physcia exilis* Michx. Fl. Amer. **2**: 327. 1803.).*

* Type locality: "Carolinae." Original Description: "P. pusilla, sordide exalbida-divaricatim intricatimque setaceo-ramosissima: scutellis minutis, lateralibus, planius,

SUBSTRATA: Trees, shrubs and rocks (type).

GEOGRAPHICAL DISTRIBUTION: Occurs commonly in the Austral and Transitional Zones from Ontario to North Carolina, west to Ohio, Illinois, Iowa, Wisconsin, Minnesota and California, and southward.

OBSERVATIONS: This species has the widest distribution of the members of the genus in our area, and is easly recognized. Though Dr. Wainio cites Michaux's *Physcia exilis* as a species on account of its pale thallus and eciliate apothecia, these characters are only phases of this plant. The color of the thallus is rarely pure yellow in true *T. chrysophthalmus*, and is not so in the type. Neither did Linnaeus describe it as yellow. The condition with ciliate apothecia is such a variable development that it hardly warrants even varietal recognition.

EXSICCATI: Cummings, No. Amer. Lichens *19, 84, 97, 98;* Howe, Lich. Novae Angliae *54;* Tuck. Lich. Amer. Sept. *80*, as *Parmelia chrysophthalma.*

### TELOSCHISTES VILLOSUS (Ach.) Norm.

*Parmelia villosa* Ach. Meth. Lich. 254. 1803.

*Teloschistes villosus* Norm. Nyt. Mag. Naturv. **7**: 228. 1853.

TYPE: In the Acharian herbarium, Helsingfors, Finland.

TYPE LOCALITY: "Peru," etc.

ORIGINAL DESCRIPTION: "Thallo membranaceo caespitoso villoso-hispido cinereo subtus albido nudo canaliculato, laciniis linearibus ramosis subflexuosis; scutellis lateralibus rubris."

FIGURE: Ach. Lich. Univ. *pl. 9, f. 8.* 1910.

DIAGNOSIS: *Thallus* suberect, compressed-*canaliculate, hispid,* apothecial disk *red.*

DESCRIPTION (typical): *Thallus* caespitose (alt. 4 cm.), subrigid, compressed-canaliculate, cinereus; *cortex* glabrous, hispid above; dichotomous (maximum width 2 mm.), laciniate, attenuate, apices subterete. *Apothecia* uncommon, subterminal, concave, marginate, disk red (maximum diameter 3 mm.). *Spores* simple, 11–16 × 4.5–6 μ.

culis, nitide croceis, margine simplici." = *Parmelia chrysophthalmus β exilis* Tuck., Synop. Lich. N. E. 31. 1848. Also *Physcia villosa* var. *Dickienna* Linds. Trans. Roy. Soc. Edin. **22**: 254. 1867. *Teloschistes flavicans* f. *cinerascens* Müll. Arg. (Bot. Jahrb. **15**: 513. 1893) shows the parallel phase in the preceding species.

SUBSTRATA: Shrubs.

GEOGRAPHICAL DISTRIBUTION: Not uncommon in the Transition Zone from Santa Cruz Island south to Lower California.

OBSERVATIONS: This well marked species was added to our lichen flora in 1910 when I recorded specimens collected by

FIG. 2. The Acharian type of *Parmelia villosa*.

Miss Blanche Trask in 1892.* It had been secured, however, in Lower California at an earlier date and distributed in Miss Cummings's Exsiccati.

EXSICCATI: Cummings, No. Amer. Lichens *154*.

* See also Hasse, Bryologist **13**: 61. 1910.
Bot. Gaz. **49**: 320; **50**: 159. 1910.

# New species of Uredineae—IX*

JOSEPH CHARLES ARTHUR

In the interim of four years since the last group of species was published in this series a considerable number of forms have been separated which appear to be undescribed. Some of these forms have been recognized for a long time, such as *Puccinia Dondiae*, collected in 1882, *P. agnita* and *P. valida*, both collected in 1898, but as they have been known from single collections only, their previous publication has been withheld, hoping that more information would become available. The species are now issued to call the attention of collectors to them.

Four species of short-cycle forms are included in this group, *Uromyces abbreviatus* on *Psoralea*, *Puccinia tumamocensis* on *Dipterostemon*, *P. agnita* on *Claytonia* and *P. Fraseri* on *Hieracium*. These are especially interesting, as they are on common hosts bearing long-cycle species. The first two mentioned are closely correlated with more abundant long-cycle forms occupying the same region and the same hosts. Such forms are often overlooked in the too common way of naming collections without much regard to the life cycle. To the student interested in the phylogeny and classification of the rusts these short-cycle forms present a suggestive series of problems, and their recognition under distinctive names is highly important.

**Uropyxis Wootoniana** sp. nov.

O. Pycnia not seen.

II. Uredinia hypophyllous, numerous, scattered, rarely confluent, round to oblong, 0.5–1 mm. long, early naked, somewhat pulverulent, pulvinate, light cinnamon-brown; paraphyses absent; urediniospores terete-fusiform or ovate-fusiform, 13–19 by 35–45 $\mu$; wall pale yellow or colorless, 2–4 $\mu$ thick, thicker at apex, 5–9 $\mu$ with hyaline umbo, finely and closely verrucose, the pores 8–12

* New Species of Uredineae I–VIII: Bull. Torrey Club **28**: 661–666. 1901; **29**: 227–231. 1902; **32**: 1–8. 1904; **33**: 27–34, 513–522. 1906; **34**: 583–592. 1907; **37**: 569–580. 1910; **38**: 369–378. 1911.

in two zones of 4–6 pores each, one above and one below the equator.

III. Telia hypophyllous, similar to the uredinia, chocolate-brown; teliospores broadly ellipsoid, 19–23 by 23–27 μ, rounded above and below, moderately constricted at septum; wall chestnut-brown, 3–5 μ thick, with longitudinal ridge-like, parallel striations, the pores lateral, indistinct; pedicel colorless, terete, 3–5 μ thick, 145–165 μ long, the wall thickened to obliterate the lumen except at the base.

On *Berberis haematocarpa* Wooton (*Odostemon haematocarpus* Heller), Organ Mountains, New Mexico, December 23, 1903, *3732;* Filmore Canyon, Organ Mountains, New Mexico, November 9, 1908 (type); Queen, Guadalupe Mountains, New Mexico, August 1, 1909, all by E. O. Wooton. I am pleased to have the opportunity to name this conspicuous and distinctive rust in honor of the able botanist who has been highly successful in making known the plants of New Mexico, and who not only supplied all the specimens of the rust so far seen, but also detected and described the host. The host is an evergreen shrub occurring on the mountain slopes in the southern part of New Mexico and Arizona.

**Uromyces ornatipes** sp. nov.

O. Pycnia not seen.

I. Aecia scattered about the slightly swollen but not discolored stem for 0.5–1 cm. in length, cylindric, 0.5–0.8 mm. high, with margin erect, erose or lacerate; peridial cells rhomboidal, 18–21 by 26–32 μ, overlapping, the outer wall smooth, 3–4 μ thick, the inner wall verrucose, 5–7 μ thick; aeciospores angularly globoid or ellipsoid, 18–23 by 24–27 μ; wall colorless, 1.5–2 μ thick, sometimes appearing thicker, very inconspicuously verrucose.

III. Telia among the aecia, seemingly arising from the aecial sori, round, 0.3–0.5 mm. in diameter, rising somewhat above surface of host, blackish brown; teliospores ellipsoid, 21–26 by 27–32 μ, rounded above and below; wall dark chocolate-brown, often opaque, 2–2.5 μ thick, thicker above, 5–7 μ, indistinctly striate; pedicel colorless, joined to the spore by a tinted collar, solid, 7–9 μ in diameter above, increasing to 10–13 μ in lower part, upper part smooth, lower part strongly rugose transversely.

Urediniospores not uncommon in the telial sori, ellipsoid, 21–24 by 26–33 μ; wall golden brown, 1.5–2.5 μ thick, sparsely verrucose, the pores equatorial, indistinct but probably 4.

On *Phrygilanthus Sonorae* (S. Wats.) Rose & Daniels (*Loranthus Sonorae* S. Wats.), Cape San Lucus, Lower California, Mexico, March, 1911, *J. N. Rose 16396*. In reference to the host Dr. Rose writes that no species of the true *Loranthus* has yet been found in America. The rust is a striking one. As no pycnia could be found, and the teliospores appear to arise from the same mycelium as the aecia, it seems probable that the aecia in this collection are the secondary form, and that the rust does not produce separate uredinia, but simply occasional urediniospores in the telial sori. The collection, although not ample, shows a fine development of the rust.

**Uromyces abbreviatus** sp. nov.

O. Pycnia hypophyllous, scattered among the telia, not numerous or conspicuous, subepidermal, in section globose, 130–150 $\mu$ in diameter.

III. Telia hypophyllous, scattered over large areas, round, 0.2–0.5 mm. across, early naked, pulverulent, chocolate-brown; teliospores ellipsoid or broadly obovoid, 20–23 by 24–37 $\mu$, rounded at both ends, or somewhat narrowed below; wall chestnut-brown, uniformly thin, 3 $\mu$, with a slight umbo over the pore, smooth; pedicel colorless, delicate, half as long as the spore, fugacious and appearing short.

On *Psoralea Purshii* Vail, Winnemucca, Nevada, July 1901, *Griffiths & Morris*, type (Griff. West Am. Fungi *390*); on *P. physodes* Dougl., Puget Sound Navy Yard, Bremeston, Washington, July 22, 1912, *E. Bartholomew 4752*. There is also an undated collection of this species in the Farlow Herbarium at Cambridge, Massachusetts, collected at Calistoga, California, by H. W. Harkness, on *P. physodes*. This species is the short-cycle form corresponding to *Uromyces Psoraleae* Peck. The aspect of the fungus in gross and microscopic characters is scarcely different from the corresponding spore-structures of the long-cycle form. In the specimens seen the telia are more numerous and highly pulverulent, making the fungus more conspicuous.

**Puccinia Carnegiana** sp. nov.

O. Pycnia amphigenous, in oval groups 1–2 mm. long, usually surrounded by aecia, or among them, subepidermal, globoid in section, about 200 $\mu$ in diameter; ostiolar filaments about 35 $\mu$ long.

I. Aecia amphigenous, in oval groups 1–4 mm. long on brownish spots, when mature falling away leaving the ruptured epidermis conspicuous; peridium delicate, deeply lacerate, recurved, the peridial cells lanceolate, rarely somewhat rhomboidal, pointed, 40–60 μ long, the outer wall 3–5 μ thick, smooth and transversely striate, the inner wall somewhat thinner, verrucose; aeciospores globoid, 23–27 by 24–34 μ; wall colorless, 2–3 μ thick, finely verrucose.

III. Telia amphigenous, scattered, often immediately outside or within the aecial cups, rather tardily naked by a longitudinal slit, blackish, slightly pulverulent; teliospores ellipsoid or oblong, 27–34 by 42–58 μ, slightly or not constricted at septum, usually rounded at both ends; wall blackish when mature, uniformly 2.5–3.5 μ thick, occasionally slightly thicker above, coarsely and prominently tuberculate; pedicel colorless, fragile, once length of spore or less.

Urediniospores in the telia rather common, broadly ellipsoid or obovoid, 27–35 by 32–42 μ; wall golden- or cinnamon-brown, about 1.5 μ thick, finely and moderately verrucose-echinulate, the pores 12–15, scattered.

On *Dipterostemon pauciflorus* (Torr.) Rydb. (*Brodiaea capitata pauciflora* Torr., *Dichelostemma pauciflorum* Standley), Tumamoc Hill, on grounds of the Desert Botanical Laboratory of the Carnegie Institution of Washington, Tucson, Arizona, altitude 2,700 feet, February 25, III, *5800*, February 26, O, I, III, *5801* type, February 26, O, I, *5802*, all by J. C. Arthur and F. D. Fromme; also March 12, III, by W. A. Cannon. The collections were made at different spots on Tumamoc Hill in vicinity of the Laboratory, and in the year 1914.

A part of *5802* was used for a culture made at the protected south side of the Laboratory building in the open, the resulting infection being watched and the matured sori transmitted by Dr. W. A. Cannon of the Laboratory staff. This culture is reported in Mycologia (7: 85. March, 1915), under the name *Puccinia nodosa*. A water culture was made of the urediniospores, which showed that they were capable of germination. Some aberration was observed in their behavior, but the stay at the Laboratory was too brief to obtain exact data, or to decide upon their significance. The urediniospores in a number of collections, kindly sent to Lafayette, Indiana, by Dr. Cannon, could not be made to germinate. The behavior of urediniospores has never

been studied in a species of this character, in which the sowing of aeciospores produces telia directly without the intervention of uredinia. It is probable that this is the first time that such spores have been seen to germinate. It is not known whether or not they are capable of infecting a plant and reproducing the rust.

*Puccinia nodosa* Ellis & Harkn., a species found on *Dipterostemon capitatus* (Benth.) Rydb. (*Brodiaea capitata* Benth.) from San Francisco to the southern part of California, differs from the one here proposed by having a definite uredinial stage with prominent sori. The hosts of the two species are similar, differing most strongly in the abundance of flowers in the umbels. *D. capitatus* is a Californian species, while *D. pauciflorus* ranges through southern Arizona into the border of New Mexico. *Puccinia nodosa* has not yet been cultured.

It was through the kindness and generous assistance of the director of the Desert Laboratory and of his staff of workers that the discovery of this rust and the brief but highly significant studies of it were made possible, and it is to acknowledge in part this aid to science that the first word in the title of the institution has been chosen for the specific name of the new species.

**Puccinia tumamocensis** sp. nov.

O. Pycnia hypophyllous in small groups surrounded by the telia, subepidermal, globoid as seen in section, 130–190 μ in diameter; ostiolar filaments 30–40 μ long.

III. Telia hypophyllous, closely placed in elliptical groups 3–10 mm. long surrounding the pycnia, elliptical, 1–2 mm. long, becoming naked by longitudinal rupture of the epidermis, pulverulent, blackish; teliospores broadly ellipsoid, 32–42 by 48–61 μ, slightly or not constricted at septum, rounded at both ends; wall dark chestnut- to blackish-brown, uniformly 3–5 μ thick, coarsely and prominently tuberculate; pedicel colorless, fragile, appearing short.

On *Dipterostemon pauciflorus* (Torr.) Rydb. (*Brodiaea capitata pauciflora* Torr.), Tumamoc Hill, grounds of the Desert Botanical Laboratory, Tucson, Arizona, altitude 2,700 feet, February 26, 1914, *J. C. Arthur & F. D. Fromme 5801a*. This is the short-cycle form corresponding to the long-cycle species, *P. Carnegiana*

and *P. nodosa*. The teliospores are somewhat broader than in those species, and the general appearance is that of a more luxuriant growth. There is considerable resemblance to the short-cycle species *P. Lojkojana* Thüm., occurring in southeastern Europe on *Ornithogalum* and *Muscari*. The name has been chosen to indicate the only locality where the species has yet been found, and in compliment to the management of the Desert Botanical Laboratory, who so enthusiastically assisted Dr. Fromme and myself in our studies of the rust parasites of the vicinity. Tumamoc Hill is a rocky eminence having the sparse desert vegetation characteristic of the arid region about. In the early spring *Dipterostemon*, more usually called *Brodiaea*, is abundant over the whole area, up to the very doors of the Laboratory, its attractive flowers lending a special charm to the place. This species of rust and *P. Carnegiana* occur here and there in fair abundance, but are not general. The isolated manner of occurrence gave some countenance to the suggestion that mycelium hibernated in the bulbs. The problem of continuity through the long arid season is, however, one that will require considerable investigation. The interest in its solution is not confined to this species, or even to similar desert species, important as such knowledge would prove, but extends to species in other regions, including some of highly economic value.

**Puccinia agnita** sp. nov.

O. Pycnia chiefly epiphyllous, loosely grouped on discolored spots, punctiform, moderately conspicuous, subepidermal, angularly globoid in section, 65–115 $\mu$ in diameter; ostiolar filaments about 35 $\mu$ long.

III. Telia chiefly hypophyllous, irregularly grouped on pale spots 4–6 mm. across, round or oblong, 2–8 mm. across, at first covered by the membranous epidermis, soon naked, very pulverulent, light chestnut-brown; teliospores ellipsoid, 21–27 by 29–42 $\mu$, rounded or obtuse at both ends, slightly or not constricted at septum; wall golden-brown, uniformly thin, 1.5–2 $\mu$, inconspicuously verrucose, the pore in upper cell apical, in lower cell depressed two-thirds below septum, both pores with hyaline papilla; pedicel colorless, fragile, appearing short.

On *Claytonia megarrhiza* (A. Gray) Parry, Cumberland Mine, La Plata Mountains, Colorado, altitude 12,000 feet, July 15, 1898,

*Baker, Earle & Tracy 1045.* A short-cycle form corresponding to *Puccinia Claytoniata* (Schw.) Peck, but with the teliospores slightly broader, and the telia more definitely grouped.

**Puccinia Fraseri** sp. nov.

O. Pycnia not seen, probably wanting.

III. Telia hypophyllous, sometimes also on upper surface of leaf, evenly scattered over large areas, usually covering the whole leaf, round, 0.2–0.5 mm. across, strongly pulvinate, pale cinnamon-brown, usually whitish by germination, ruptured epidermis not visible; teliospores oblong, 15–21 by 37–45 μ, rounded or obtuse at both ends, slightly or not constricted at septum; wall very pale cinnamon-brown or nearly colorless, 1.5–2.5 μ thick, much thicker above, 5–9 μ, smooth; pedicel colorless, broad, 6–10 μ, once length of spore or less, the wall very thin but firm.

Urediniospores occur occasionally among the teliospores, obovoid, 16–21 by 23–29 μ; wall pale yellow or nearly colorless, 2–3 μ thick, sparsely echinulate, the pores indistinct, probably 3 or 4, equatorial.

On *Hieracium scabrum* Michx., Pictou, Nova Scotia, June 19, 1909, May 25 and June 22, 1910, *W. P. Fraser*, the last collection being taken as the type. It would be natural to infer that this short-cycle, leptoform species would be correlated with the common long-cycle form on the same and similar hosts. The common *Puccinia Hieracii* occurs in the same locality on *H. scabrum*, but its ellipsoid, verrucose teliospores indicate a different relationship. I take pleasure in dedicating the species to Mr. Fraser, who has furnished all the material for its study, and who is also entitled to much credit for his fine contributions to the knowledge of Uredinales and especially of the life history of a number of species.

**Puccinia valida** sp. nov.

II. Uredinia hypophyllous, scattered unevenly, irregularly rounded or somewhat elongated, 0.3–0.7 mm. across, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores ellipsoid to broadly obovoid, 17–21 by 22–28 μ; wall cinnamon-brown, 1.5–2 μ thick, moderately echinulate, the pores 2, somewhat superequatorial.

III. Telia hypophyllous, scattered, moderately pulvinate, similar in appearance to the uredinia, but slightly darker; telio-

spores oblong or ovate-oblong, 13–19 by 28–39 μ, rounded at apex, somewhat narrowed below, slightly constricted at septum; wall cinnamon-brown, thin, 1 μ, thickened above, 4–7 μ, smooth; pedicel tinted, fragile, as long as the spore, or broken off much shorter.

On *Dioscorea convolvulacea* Schlecht & Cham., Jalapa, Mexico, October 2, 1898, *E. W. D. Holway 3115*. The host has recently been examined at the Gray Herbarium, where a phanerogamic specimen is deposited. The species differs from the nearly allied *D. grandifolia* Schlecht. in having much shorter leaves and longer staminate racemes. A number of species of rusts have been described on *Dioscorea*, and placed under different genera, from each of which the above form appears to be wholly distinct.

**Puccinia Dondiae** sp. nov.

II. Uredinia amphigenous; urediniospores broadly ellipsoid, 26–29 by 32–39 μ; wall cinnamon-brown, 1.5 μ thick, finely and closely echinulate, the pores 8, scattered.

III. Telia amphigenous, large, 0.4–0.7 mm. across, pulverulent, blackish-brown; teliospores ellipsoid, 32–39 by 42–51 μ, rounded at both ends, not constricted at septum; wall dark chocolate-brown, uniformly 4–5 μ thick, prominently and coarsely verrucose; pedicel nearly or quite as long as the spore, colorless or slightly tinted, more or less hygroscopic.

On *Dondia intermedia* (S. Wats.) Heller, San Diego, California, April 19, 1882, *Marcus E. Jones 3153*. The host of this collection has recently (January, 1915) been determined by Mr. Paul C. Standley of the United States National Herbarium. Although collected thirty-three years ago the species does not appear to have been found since.

**Aecidium Farameae** sp. nov.

O. Pycnia epiphyllous, in small groups 1–3 mm. across, or scattered over larger hypertrophied areas, becoming blackish-brown, subepidermal, deep-seated, 144–200 μ in diameter; ostiolar filaments short.

I. Aecia hypophyllous and caulicolous, in circular groups 2–5 mm. across, on discolored, slightly thickened spots, or scattered widely on much hyptertrophied and distorted petioles and shoots, low cylindric, small, 0.2–0.3 mm. in diameter; peridium erect, irregularly torn; aeciospores angularly globoid or oblong, 23–26 by 26–34 μ; wall colorless, 1.5 μ thick, much thicker above, 7–12 μ, moderately and evenly verrucose.

On *Faramea occidentalis* (L.) A. Rich., San Diego de los Baños, province of Pinar del Rio, Cuba, August 31 to September 3, 1910, *Britton, Earle & Gager 6855*. The deep-seated pycnia and aecia are especially characteristic of this species of rubiaceous rust. It may or may not be heteroecious.

**Uredo fatiscens** sp. nov.

II. Uredinia amphigenous, scattered or somewhat striate on yellowish or brownish spots, oblong, 0.3–0.5 mm. long, pulvinate, rather tardily naked, cinnamon-brown; urediniospores fusiform, 16–19 by 42–58 μ, narrowed at both ends, provided with a hyaline beak at apex, 5–7 μ long; wall golden-brown, thin, 1–1.5 μ, thickened above with a beak, the pores at or slightly above the equator, 2.

On *Carex Pseudo-Cyperus* L., Leland, Michigan, August 29, 1913, *J. C. Arthur*. This highly distinctive rust, whose slender, fusiform spores are very unlike those of any other cyperaceous rust known to the writer, was found in an open marsh close to the east shore of Lake Leelanau. Only a small infected area on two or three leaves was secured. The host was in fruit, and its determination has been made by Dr. Theo. Holm.

PURDUE UNIVERSITY,
LAFAYETTE, INDIANA

# INDEX TO AMERICAN BOTANICAL LITERATURE

## 1915

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in the broadest sense.

Reviews, and papers that relate exclusively to forestry, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omissions, their kindness will be appreciated.

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**Appel, O.** The control of cereal and grass smut and the *Helminthosporium* disease in Holland and Germany. Phytopathology **5**: 230–232. Au 1915.

**Arthur, J. C.** Uredinales of Porto Rico based on collections by F. L. Stevens. Mycologia **7**: 168–196. 28 Jl 1915.

Includes descriptions of *Ravenelia Stevensii*, *Argomyces insulanus*, and *Uromyces densus*, spp. nov.

**Bailey, I. W., & Shepard, H. B.** Sanio's laws for the variation in size of coniferous tracheids. Bot. Gaz. **60**: 66–71. *f.* 1. 16 Jl 1915.

**Bailey, L. H.** Some present needs in systematic botany. Proc. Am. Philos. Soc. **53**: 58–65. 19 Je 1915.

**Bakke, A. L.** The water relations of the mesquite. Ames Forester 3: 87–91. 1915. [Illust.]

**Ball, C. R.** Notes on North American willows—II. Bot. Gaz. **60**: 45–54. *f.* 1–3. 16 Jl 1915.

Includes *Salix pennata* sp. nov.

**Blake, S. F.** A revision of *Salmea* and some allied genera. Jour. Bot. **53**: 193–202. Jl 1915; 225–235. Au 1915.

Five new species are described.

**Blake, S. F.** Some neglected names in Walter's Flora Caroliniana. Rhodora **17**: 129–137. 10 Jl 1915.

**Blake, S. F.** *Steiractinia*, a new genus of Compositae. Jour. Bot. **53**: 153–158. *pl. 539.* Je 1915.
Six new species are described.

**Blake, S. F.** Three new Perymeniums. Jour. Bot. **53**: 135–137. My 1915.

**Blake, S. F.** *Trichospira verticillata* (L.) Blake n. comb. Torreya **15**: 106. 29 Je 1915.

**Blodgett, F. M.** Sweet pea powdery mildew. Phytopathology **5**: 237. Au 1915.

**Bonazzi, A.** Cytological studies of *Azotobacter chroococcum*. Jour. Agr. Research **4**: 225–240. *pl. 31–33.* 15 Je 1915.

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